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DEPENDENCE OF SUSTAINABILITY ON COUNTRY RISK INDICATORS IN EU BALTIC SEA REGION COUNTRIES

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Abstract. Country risk and economic sustainability become more and more important in the contemporary economic world. This paper proposes the analysis on relationship between country risk and economic sustainability in EU Baltic Sea region countries, based on statistical data of the year 2012. Investigations and calculations of rankings for country risk and sustainability were made and the results were optimized by implementing MOORA (Multi-Objective Optimization by Ratio analysis) and MULTIMOORA (MOORA plus Full Multiplicative Form) methods. Furthermore, correlation analysis was prepared and the informative results were obtained. Starting with a system of 8 alternative responses on 21 objectives (indicators), from several approaches the unambiguous results were obtained, which could be engaged in the process of creating new model for country risk assessment and its dependent sustainability indicators for EU Baltic Sea region countries.

Keywords: country risk, economic sustainability, economic security, MOORA, MULTIMOORA, EU Baltic Sea region.

JEL Classification: G11, G14, G23.

Introduction

Because of increasing uncertainty in global economy every year it becomes more and more difficult to analyse and predict changes in the financial, economic and political sectors of business. The importance of country risk analysis is now more understandable and potential for it is growing by establishing more and more country risk rating agencies, which combine a wide range of qualitative and quantitative information regarding alternative measures of economic, financial and political risk into associated composite risk ratings. The need for qualitative assessment of country risk is in great demand. Several rating agencies of country risk assessment are distinguished. However, the accuracy of any rating agency with regard to any or all of these measures is open to question. Hoti (2005) in the study provides a qualitative comparison of country risk rating systems used by seven leading rating agencies, as well as a novel analysis of four risk ratings using univariate and multivariate volatility models for nine East European countries. To the best of our knowledge there is no such study that applies MOORA or MULTIMOORA methodology to examine the country risk assessment problems using this data set.

Over the past two decades interest has grown in developing indicators to measure sustainability. Moreover, it should be pointed out that sustainability is presently seen as a delicate balance between the economic, environmental and social health of community, nation and the earth of course. Measures of sustainability at present tend to be an amalgam of economic, environmental and social indicators. Sustainability however is more than just the interconnectedness of the economy, society and the environment. Important though these are, they are largely only the external manifestations of sustainability. The internal, fundamental, and existential dimensions are neglected. In this study, our focus was on the relationships among the country risk and economic sustainability.

The article presents an analysis for relationship/dependence between country risk and economic sustainability in 8 EU Baltic Sea region countries by investigating different indicators which were grouped according to nature of their applications in each country. MOORA and MULTIMOORA methods were used for ranking calculation data and correlation analysis was used for finding out the relationship between groups of variables.

1. Definitions of country risk

The literature suggests that risk refers to the "probability of occurrence of political events that will change the prospects for profitability of a given investment" (Haendel *et al.* 1975). One of the approaches adopts a practical stance and analyzes the risk as a negative outcome. Subsequently, Meldrum (2000) continued this line of theorizing that risk will exist if it implies a possible loss or at least, a potential reduction of the expected return, as stated by.

Numerous studies have analyzed the concept of risk. As a consequence of this debate, risk could have different meanings and could be understood either as a performance variance or just as the likelihood of a negative outcome that reduces the initially expected return. The concept of downside risk was already mentioned by Markowitz (1959). The paper of Nawrocki (1999) reviews the literature and presents the advantages of using a downside risk approach in view of a total risk stance.

Roy (1952), Bawa and Lindenberg (1977) had already integrated the notion of downside risk into portfolio theory, but Estrada (2000), Reuer and Leiblein (2000) have emphasized the usefulness of the downside risk approach for studying emerging markets and international joint ventures. Busse and Hefeker (2006) have also analyzed the risk and its influence of foreign direct investments. Other scholars, Quer, Claver and Rienda (2007), have introduced an integrated approach by comparing the impact of country risk and cultural distance on entry mode choice.

Analyzing the literature over the last 40 years, situation with country risk changes, as more and more companies are making their businesses abroad, as a result, the specific risks it engenders occurs, whatever is the source of risk and the nature of the industry.

Without doubt, specific features of each investment or transaction type must be taken into account. Hence, viewed broadly, country risk analysis (CRA) tries to define the potential for these risks in order to decrease the expected return of a cross-border investment. Such definition rejoins the very early articles of Gabriel (1966) or Stobaugh (1969) where the investigation was made on difference in investment climate at home and abroad. It highlights the specific risks when doing business abroad, outside the national borders of the company's country of origin. Sometimes economic level of country's development is not so important, as even economically developed countries can face with a degree of country risk. Finnerty (2001) noted that "many project finance professionals would argue that natural resource projects in the United States are exposed to political risk because of the proclivity within the United States to change the environmental laws and apply the new laws retroactively".

A comprehensive formulation of country risk theory is yet in progress. From a historical perspective both the theoretical and empirical literature indicates the implicit assumption that, for a given country, imbalances in the economic, social and political fields are likely to increase the risk of investing there. Because of the multiplicity of the sources of risk, the complexity of their interactions and the variety of social sciences involved, an underlying theory of country risk is still missing. So far, most of the research merely consists of a classification and a description of the various potential sources of risk, and the assessment methods turn these elements into numerical variables without any scientific justification. Fitzpatrick (1983) writes on the subject that "the literature is found to define political event risk rather than political risk". Citron and Nickelsburg (1987) have proposed a model of country risk for foreign borrowing as well as estimated which model incorporates a political instability variable. The proposed model predicts high probabilities of default for most of the actual default dates for six countries looking on historical perspective. This is suggestive of how to understand the phenomenon of foreign debt default. There are a lot of studies related to country risk, its financial integration in a country, the impact on economic and other aspects of country's welfare (Cathy, Goldberg 2009; Kesternich, Schnitzer 2010; Benítez *et al.* 2007; Bordo *et al.* 2009; D'Argensio, Laurin 2009).

2. Evaluation of country risk

The country risk of one country could be expressed by a single index, which shows the degree of the overall risk to invest in or loan to this country. Two types of indices, which represent the degree of country risk, discrete and continuous, exist. Discrete type includes several risk levels, which are predefined and every country is in one level. The number of risk levels may vary from 1 to 20. The single index representing the degree of country risk is a set of different factors about the country. The main interested factors are political and economic-financial ones, and the total number of factors used may vary from less than ten to more than twenty.

Ratha *et al.* (2011) suggest predicting sovereign ratings for developing countries that do not have risk ratings from agencies (such as Fitch, Moody's, and Standard and Poor's).

It is important to determine the volume and cost of capital flows to developing countries through international bond, loan, and equity markets. Sovereign rating also acts as a ceiling for the foreign currency rating of sub-sovereign borrowers and can be important for their access to international debt and equity capital. Shadow ratings for several developing countries, that have never been rated, could be generated and then it could be found that unrated countries are not always at the bottom of the rating spectrum. Several of them will be in a similar range to that of the emerging market economies with capital market access.

Chen, Gang and Jianping (2008) proposed a new approach for country risk evaluation, which is based on the MH DIS multicriteria decision aid method (Multi-Group Hierarchical Discrimination). They took a sample, consisting of 40 main oil-producing countries and used to estimate the performance of the method in classifying the countries into two groups. A comparison with multiple discriminant analysis, logit analysis and probit analysis was also performed. The results indicate the superiority of the MH DIS method as opposed to these traditional discrimination techniques already applied in country risk assessment. Similarly, Cathy and Goldberg (2009) introduced their point of view on country risk and financial integration by presenting a case study. Marshall *et al.* (2009) have estimated and determined the country risk of emerging market as well as dynamic conditional correlation by using GARCH model, which could be one of alternative methods for country risk evaluation.

Schroeder (2008) in her paper also surveys the history and current status of country risk assessment. The goal is to understand why the country risk assessors have such a poor track record in anticipating the onset of financial crises. The development of the field reflects changes in the composition of international capital flows. These changes have confounded a definition of a country risk, especially if the definition is centered on a particular event. It is then argued that the field has reached an impasse, and this impasse is related to the methods of abstraction and the current crisis of vision within the science of economics. This crisis of vision, as it pertains to theories of financial crises, has led to increased reliance on quantitative methods in the field of country risk. So, it is very important to find the object of country risk assessment, which is not to monitor for a particular event or symptom of financial crisis, but, rather, to monitor for a particular state of the economy. Besten (2007) has introduced an analysis on similar risk assessment approaches for European countries.

3. Measuring sustainability and indices for its evaluation

For the past two decades, there have been many local, regional, state/provincial, national and international efforts to find useful sustainability indicators. The key feature of some of these suggested indicators is that they are defined through public participation. Therefore, these indicators are meaningful to the respective community. However, indicators based on asymmetric information and the heterogeneous interests of the stakeholders often make them incomparable, and therefore, less usable in other environments. International Institute for Sustainable Development (IISD) hosts and manages the compendium of sustainable development indicator initiatives around the world. Currently, the site has information about 669 initiatives (IISD 2006).

The UN Commission on Sustainable Development (UNCSD) from its working list of 134 indicators derived a core set of 58 indicators for all countries to use. The CSD is currently updating this set of indicators. We believe that where possible, a universal set of indicators can be defined, but local sustainability concerns should be addressed in assessing the sustainability of an economic activity (Meadows 1998). We should work to find a mechanism that is flexible enough to incorporate these diverse sets of indicators (Pinter *et al.* 2005), and yet give a comparable index.

Recent initiatives include the development of aggregate indices, headline indicators, goal-oriented-indicators, and green accounting systems. Early composite indices include Measure of Economic Welfare (MEW) by Nordhaus and Tobin (1973), Index of Social Progress (ISP) by Estes (1974), Physical Quality of Life Index (PQLI) by Morris (1979), and Economic Aspects of Welfare (EAW) by Zolotas (1981), Brekke (1997). However, it challenges the concept of distinguishing economic welfare from noneconomic welfare.

Indices developed in the 1990s (Singh *et al.* 2011) to measure the aggregate performance of the economy or the sustainability include Human Development Index (HDI) by the UNDP (1990), Sustainable Progress Index (SPI) by Krotscheck and Narodoslawsky (1994), Ecological Footprint by Rees and Wackernagel (1996, 1997), Material Input Per Service Unit (MIPS) by Schmidt-Bleek (1994), Index for Sustainable Economic Welfare (ISEW) by Daly and Cobb (1989), Genuine Progress Indicator (GPI) by Cobb, Halstead and Rowe (1995), Genuine Savings Indicator (GSI) by Hamilton (1999), Barometer of Sustainability by IUCN-IDRC (1995), and Environmental Pressure Indicators (EPI) by EU (1999).

The Consultative Group on Sustainable Development Indicators (CGSDI) at IISD as part of their effort to create “an internationally accepted sustainable development index” produced the Dashboard of Sustainability, a performance evaluation tool (Ronchi *et al.* 2002)

More recently developed indices include Total Material Requirement by EEA (2001), Eco-efficiency Indices by WBCSD (2003), the Compass of Sustainability by Atkinson *et al.* (1997), Environmental Sustainability Index (ESI) and Environmental Performance Index (EPI) by YCELP, CIESIN, WEF (2001, 2002a, 2002b). Most of these indices are not used by policy-makers due to measurement, weighting and indicator selection problems (Pinter *et al.* 2005). However, some of them are popular among different stakeholders.

There are two distinct methodologies that can be found in all of these. Mainstream economists use monetary aggregation method, whereas scientists and researchers in other disciplines prefer to use physical indicators (Moffatt 1996). Economic approaches include greening the GDP, resource accounting based on their functions, sustainable growth modelling, and defining weak and strong sustainability conditions. For example, recently developed ISEW and GPI are corrections of the National Income (NI) accounts for environmental and some other non-market activities to reflect Hicksian income (Dewan 2006).

Some of the indicators that are unaccounted for, or not accounted for as costs, in the GDP, but are included in either ISEW or GPI as "defensive expenditures" (Daly, Cobb 1989), are private expenditures on health and education; costs of commuting, urbanization and auto accidents; costs of different types of pollution, depletion of non-renewable resources and long term environmental damage; the value of volunteer work; and the costs of crime, family breakdown, underemployment, etc.

4. MOORA and MULTIMOORA methods

Multi-Objective Optimization by Ratio Analysis (MOORA) method was introduced by Brauers and Zavadskas (2006). This method was developed (Brauers, Zavadskas 2010) and became MULTIMOORA (MOORA plus the full multiplicative form). These methods have been applied in different studies (Brauers *et al.* 2007, 2010; Brauers, Zavadskas 2009; Brauers, Ginevičius 2010; Baležentis *et al.* 2010, 2013; Kracka, Zavadskas 2013; Brauers, Kracka, Zavadskas 2012; Brauers, Kildiene 2013; Kildiene 2013; Balezentis, Zeng 2013; Zeng *et al.* 2013).

According to Brauers and Zavadskas (2006), MOORA goes for a ratio system in which each response of an alternative on an objective is compared to a denominator, which is representative for all alternatives concerning that objective.

MOORA method begins with the matrix X, where its elements x_{ij} denote j-th alternative of i-th objective ($i = 1, 2, \ldots, n$ and $j = 1, 2, \ldots, m$). In our case we have $m = 8$ alternatives (EU Baltic Sea region countries) and $n = 21$ objectives (indicators). MOORA method consists of two parts: the ratio system and the reference point approach.

The ratio system of MOORA. The ratio system defines data normalization by comparing alternative of an objective to all values of the objective:

$$x_{ij}^* = \frac{x_{ij}}{\sqrt{\sum_{j=1}^{m} x_{ij}^2}}, \tag{1}$$

where x_{ij} = response of alternative j on objective i; $j = 1, 2, ..., m$; m – number of alternatives; $i = 1, 2, \ldots n$; n – number of objectives; x^*_{ij} – a dimensionless number representing the normalized response of alternative j on objective i. These responses of the alternatives on the objectives belong to the interval [0; 1].

These indicators are added (if desirable value is maximal) or subtracted (if desirable value is minimal) and summary index of state is derived according by formula:

$$y_j^* = \sum_{i=1}^{i=g} x_{ij}^* - \sum_{i=g+1}^{i=n} x_{ij}^*, \tag{2}$$

where $i = 1, 2, \ldots, g$ as the objectives to be maximized; $i = g + 1, g + 2, \ldots, n$ as the objectives to be minimized; y^*_j – the normalized assessment of alternative j with respect to all objectives.

The reference point of MOORA. This reference point theory starts from the already normalized ratios as defined in the MOORA method. The *j*-th coordinate of the reference point can be described as $r_j = \max x^*_{ij}$ in maximization case. Every coordinate of this vector represents maximum or minimum of certain objective. Then every element of normalized responses matrix is recalculated and final rank is given according to the deviation from the reference point and the Min-Max Metric of Tchebycheff:

$$\min_i(\max_j | r_j - x^*_{ij} |). \tag{3}$$

The full multiplicative form of multiple objectives and MULTIMOORA. Brauers and Zavadskas (2010) proposed updated MOORA with the Full Multiplicative Form method embodying maximization as well as minimization of purely multiplicative utility function. Overall utility of the *j*-th alternative can be expressed as dimensionless number:

$$U'_j = \frac{A_j}{B_j}, \tag{4}$$

where $A_j = \prod_{g=1}^{i} x_{gi}$, $j = 1,2,\ldots,m$; m – number of alternatives; i – number of objectives to be maximized; $B_j = \prod_{k=i+1}^{n} x_{kj}$, n-i – number of objectives to be minimized, U'_j – utility of alternative *j* with objectives to be maximized and objectives to be minimized.

Thus MULTIMOORA assemble MOORA (which includes Ratio System and Reference point) and the Full Multiplicative Form.

5. Analysis of country risk and sustainability variables

The main task is to find out the relationship between country risk, economic sustainability and economic security (Fig.1).

In this article relationship between country risk and economic sustainability ratios will be analyzed. There is an assumption, proposed by the authors, that all three variables are interrelated between each other in one or another direction/dependence and it is the main hypothesis, which should be approved by several scientific researches.

After consolidating different types of variables' splitting, different groups of country risk and sustainability indicators were created (Table 1, Table 2).

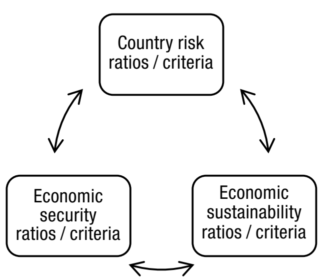

Fig.1. Interdependence between ratios
Source: created by authors.

Table 1. Grouping of indicators for country risk evaluation

Domestic economic variables	Macroeconomic policy evaluation	Balance of payments	Social indicators
Gross domestic investment (% of GDP)	Inflation (end of year change %)	The current account balance (% of GDP – 3 year average)	Unemployment rate (% of labour force)
GDP (PPP –US $, billions)	Real effective exchange rate	Balance of trade (mil. EUR)	Natural population change
Private consumption (% of GDP)	Current taxes on income, wealth, etc. (% of GDP)	Exports of goods and services (% of GDP)	Employment (annual averages)

Table 2. Grouping of indicators for country's sustainability evaluation

Economic well-being/ monetary indicators	Foundational well-being/ environmental indicators	Social/human indicators
Public debt (% GDP)	Consumption (global hectares)	Healthy life (years)
Genuine savings (% GNI)	Renewable water resources (annual withdrawals % renewables)	Education (enrolment rate %)
Employment rate (%)	Air quality (SO_2 emissions)	Gender equality (gender gap index)

For country risk, four main groups of variables were distinguished – domestic economic variables, macroeconomic policy evaluation, balance of payments and social indicators. Each group includes a set of three indicators, which mostly describe country risk.

For sustainability, three main groups of variables were distinguished – economic well-being (monetary) indicators, foundation well-being (environmental) and social (human) indicators. Each group includes a set of three indicators, which mostly describe country sustainability.

All data for analysis was received from European Statistics Database (Eurostat) and International Monetary Fund for EU Baltic Sea region countries. The data therefore covers 8 EU Baltic Sea region countries, the year 2012 and 21 structural indicators, 168 observations in total. The indicators used for calculations are presented in Table 3 and Table 4 (sorted based on the splitting above).

The initial data was normalized according to formula (1) for Ratio System of MOORA, and then formula (2) was used for obtaining ranks of the Ratio System of MOORA. Formula (3) was applied and initial data was computed according to formula (4), providing ranks of the Full Multiplicative Form. All calculations are provided in the appendices. Final ranks were obtained through the dominance theory (Brauers *et al.* 2011, Brauers, Zavadskas 2011). The results are presented in Table 5 for country risk indicators and in Table 6 for country sustainability indicators.

After data is ranked, the correlation analysis could be presented in order to understand the relationship between each variable for each country risk and sustainability group (Table 7).

Table 3. Country risk indicators for EU Baltic Sea region countries for the year 2012

	Domestic economic variables	*Domestic economic variables*	*Domestic economic variables*	*Macroeconomic policy evaluation*	*Macroeconomic policy evaluation*	*Macroeconomic policy evaluation*
EU Baltic Sea region countries	Gross domestic investment (% of GDP)	GDP (PPP – US $,billions)	Private consumption (% of GDP)	Inflation (end of year change %)	Real effective exchange rate	Current taxes on income, wealth, etc. (% of GDP)
Denmark	17.32	210.15	49.50	1.96	96.20	30.40
Estonia	27.63	29.09	51.80	3.76	111.30	7.00
Finland	18.74	197.48	56.30	3.45	95.00	15.90
Germany	17.22	3.197.07	57.60	2.04	93.70	12.10
Latvia	25.89	37.27	62.10	1.60	116.10	7.70
Lithuania	17.10	65.01	64.20	2.93	109.30	4.90
Poland	21.08	800.93	61.20	2.40	100.60	7.20
Sweden	18.54	392.96	48.20	1.04	100.80	18.30
	Balance of payments	*Balance of payments*	*Balance of payments*	*Social indicators*	*Social indicators*	*Social indicators*
EU Baltic Sea region countries	The current account balance (% of GDP – 3 year average)	Balance of trade (mil. EUR)	Exports of goods and services (% of GDP)	Unemployment rate (% of labour force)	Natural population change	Employment (annual averages)
Denmark	5.60	585.40	54.50	7.55	1.00	2688.60
Estonia	1.30	–203.50	92.50	9.77	–1.10	624.40
Finland	–0.60	–527.90	39.70	7.68	1.40	2483.20
Germany	6.50	16097.60	51.60	5.46	–2.30	40062.10
Latvia	–0.30	–135.90	61.10	14.94	–4.50	885.60
Lithuania	–1.40	40.30	84.20	13.25	–3.50	1278.50
Poland	–4.50	–788.20	46.20	10.35	0.00	15590.70
Sweden	7.00	459.90	48.70	7.90	2.20	4657.10

Source: created by authors.

Table 4. Sustainability indicators for EU Baltic Sea region countries for the year 2012

	Monetary indicators	*Monetary indicators*	*Monetary indicators*	*Environmental indicators*	*Environmental indicators*	*Environmental indicators*
EU Baltic Sea region countries	Public debt (% GDP)	Genuine Savings (% GNI)	Employment rate (%)	Consumption (global hectares)	Renewable Water Resources (annual withdrawals % renewables)	Air Quality (SO_2 emissions)
Denmark	46.43	13.88	6.13	5.72	10.75	67.33
Estonia	6.04	15.62	12.48	2.80	14.02	8.42
Finland	48.56	9.74	7.78	2.06	1.49	48.66
Germany	81.51	13.17	5.98	2.08	20.97	58.87
Latvia	37.77	10.53	15.63	2.47	1.17	74.41
Lithuania	38.96	10.36	15.50	2.80	9.55	42.75
Poland	55.39	7.37	9.65	1.92	19.40	25.36
Sweden	37.44	17.04	7.47	2.71	1.50	66.10

	Social/human indicators	*Social/human indicators*	*Social/human indicators*
EU Baltic Sea region countries	Healthy life (years)	Education (enrolment rate %)	Gender Equality (gender gap index)
Denmark	72.37	99.10	0.78
Estonia	67.81	89.50	0.70
Finland	72.36	100.53	0.84
Germany	73.28	95.20	0.76
Latvia	65.89	82.38	0.74
Lithuania	64.78	90.71	0.71
Poland	67.45	88.00	0.70
Sweden	74.46	92.78	0.80

Source: created by authors.

Table 5. Country risk indicators for EU Baltic Sea region countries, ranked by MOORA

	Domestic economic variables	*Domestic economic variables*	*Domestic economic variables*	*Macroeconomic policy evaluation*	*Macroeconomic policy evaluation*	*Macroeconomic policy evaluation*
EU Baltic Sea region countries	Gross domestic investment (% of GDP)	GDP (PPP – US $,billions)	Private consumption (% of GDP)	Inflation (end of year change %)	Real effective exchange rate	Current taxes on income, wealth, etc. (% of GDP)
Denmark	0.29	0.06	0.31	0.27	0.33	0.71
Estonia	0.47	0.01	0.32	0.52	0.38	0.16
Finland	0.32	0.06	0.35	0.48	0.33	0.37
Germany	0.29	0.96	0.36	0.28	0.32	0.28
Latvia	0.44	0.01	0.39	0.22	0.40	0.18
Lithuania	0.29	0.02	0.40	0.41	0.37	0.11
Poland	0.36	0.24	0.38	0.33	0.34	0.17
Sweden	0.32	0.12	0.30	0.14	0.35	0.43
	Balance of payments	*Balance of payments*	*Balance of payments*	*Social indicators*	*Social indicators*	*Social indicators*
EU Baltic Sea region countries	The current account balance (% of GDP – 3 year average)	Balance of trade (mil. EUR)	Exports of goods and services (% of GDP)	Unemployment rate (% of labour force)	Natural population change	Employment (annual averages)
Denmark	0.46	0.04	0.31	0.27	0.15	0.06
Estonia	0.11	–0.01	0.52	0.34	–0.16	0.01
Finland	–0.05	–0.03	0.23	0.27	0.20	0.06
Germany	0.54	1.00	0.29	0.19	–0.34	0.92
Latvia	–0.02	–0.01	0.35	0.53	–0.66	0.02
Lithuania	–0.12	0.00	0.48	0.47	–0.51	0.03
Poland	–0.37	–0.05	0.26	0.36	0.00	0.36
Sweden	0.58	0.03	0.28	0.28	0.32	0.11

Source: created by authors.

Table 6. Sustainability indicators for EU Baltic Sea region countries ranked by MOORA

	Monetary indicators	*Monetary indicators*	*Monetary indicators*	*Environmental indicators*	*Environmental indicators*	*Environmental indicators*
EU Baltic Sea region countries	Public debt (% GDP)	Genuine savings (% GNI)	Employment rate (%)	Consumption (global hectares)	Renewable water resources (annual withdrawals % renewables)	Air quality (SO_2 emissions)
Denmark	0.34	0.39	0.20	0.66	0.31	0.45
Estonia	0.04	0.44	0.41	0.33	0.40	0.06
Finland	0.36	0.27	0.26	0.24	0.04	0.32
Germany	0.60	0.37	0.20	0.24	0.60	0.39
Latvia	0.28	0.30	0.51	0.29	0.03	0.49
Lithuania	0.29	0.29	0.51	0.32	0.27	0.28
Poland	0.41	0.21	0.32	0.22	0.55	0.17
Sweden	0.27	0.48	0.25	0.31	0.04	0.44

	Social/ human indicators	*Social/ human indicators*	*Social/ human indicators*
EU Baltic Sea region countries	Healthy life (years)	Education (enrolment rate %)	Gender equality (gender gap index)
Denmark	0.37	0.38	0.36
Estonia	0.34	0.34	0.33
Finland	0.37	0.38	0.39
Germany	0.37	0.36	0.36
Latvia	0.33	0.32	0.35
Lithuania	0.33	0.35	0.33
Poland	0.34	0.34	0.33
Sweden	0.38	0.35	0.38

Source: created by authors.

Table 7. Correlation matrix between country risk and sustainability indicators for EU Baltic Sea region countries

	Indicators	Sustainability								
		Public debt (% GDP)	Genuine savings (% GNI)	Employ-ment rate (%)	Consump-tion (global hectares)	Renewable water resources (annual with-drawals % renewables)	Air qual-ity (SO2 emissions)	Healthy life (years)	Education (enrolment rate %)	Gender equality (gender gap index)
Country risk	Gross domestic investment (% of GDP)	–0.6662	0.0546	0.5522	–0.2169	–0.0813	–0.4081	–0.4898	–0.6776	–0.4822
	GDP (PPP – US $,billions)	0.7961	0.0351	–0.5056	–0.2924	0.6354	0.1321	0.4139	0.1924	0.0286
	Private consumption (% of GDP)	0.2657	–0.8195	0.6255	–0.5097	0.1519	–0.0893	–0.7371	–0.4957	–0.4544
	Inflation (end of year change %)	–0.3642	–0.2465	0.2307	–0.1769	0.2055	–0.7709	–0.3391	0.1885	–0.2383
	Real effective exchange rate	–0.6847	–0.0258	0.9342	–0.1285	–0.2743	–0.1793	–0.8015	–0.8396	–0.6046
	Current taxes on income. Wealth, etc. (% of GDP)	0.1778	0.4036	–0.7237	0.7664	–0.1996	0.5161	0.7273	0.7029	0.6536
	The current account balance (% of GDP – 3 year average)	0.1883	0.8348	–0.5963	0.4230	–0.0454	0.5105	0.7691	0.4353	0.4579
	Balance of trade (mil. EUR)	0.7073	0.1773	–0.4312	–0.1859	0.5376	0.2203	0.4070	0.2174	0.0590
	Exports of goods and services (% of GDP)	–0.6728	0.2548	0.6758	0.1109	0.1450	–0.4968	–0.6247	–0.4009	–0.6909
	Unemployment rate (% of labour force)	–0.4435	–0.4099	0.9456	–0.1413	–0.3228	–0.0368	–0.8935	–0.7918	–0.5267
	Natural population change	–0.0123	0.3063	–0.7439	0.2392	–0.1414	–0.0394	0.7256	0.6499	0.5995
	Employment (annual averages)	0.8099	–0.0578	–0.4892	–0.3307	0.6952	0.0668	0.3557	0.1388	–0.0408

Source: created by authors.

As we can see from Table 7, there are both positive and negative correlations between variables. The relationship between indicators is quite strong, the strongest correlation is between macroeconomic policy evaluation (country risk group) and social/human indicators (sustainability group), as well as between social indicators (country risk group) and social/human indicators (sustainability group). Domestic economic variables and balance of payments for country risk are also correlating with monetary, environmental and social indicators for sustainability. The strongest negative correlation is between real effective exchange rate (country risk ratio) and social/human group for sustainability, it means that if one indicator increases, another one will be decreasing and vice versa. Good positive correlation is between current taxes on income, wealth, etc. and natural population change (country risk ratios) and social/human group for sustainability. Such ratios of country risk as Gross Domestic Investment, Inflation, and Balance of Trade and Employment rate are not very influencing (no strong relationship) all sustainability ratios. As the main task for this research was to find out the economic sustainability dependence on country risk, we can prove that it exists.

Conclusions

1. The system of 21 indicators for 8 EU Baltic Sea region countries for country risk and economic sustainability was introduced. It includes 4 groups for country risk: Domestic economic variables (Gross domestic investment, GDP, Private consumption), Macroeconomic policy evaluation (Inflation, Real effective exchange rate, Current taxes on income, wealth, etc.), Balance of payments (The current account balance, Balance of trade, Exports of goods and services) and Social indicators (Unemployment Rate, Natural population change, Employment rate), and 3 groups for economic sustainability: Economic well-being/monetary indicators (Public debt, Genuine Savings, Employment rate), Foundational well-being/physical/environmental indicators (Consumption, Renewable Water Resources, Air Quality) and Social/human indicators (Healthy life, Education, Gender Equality).
2. Both MOORA method and its updated model MULTIMOORA could be perfectly used while evaluating and standardizing country risk and economic sustainability, as a Ratio System, Reference Point and Multiplicative form appropriately suit for case, where there are several alternatives (EU Baltic Sea region countries) and several objectives (indicators, which directly show country risk and sustainability).
3. After implementation of MOORA method for EU Baltic Sea region countries, it could be concluded that the data was correctly ranked. After correlation matrix was presented, the results are as follow: the correlation between country risk and economic sustainability exists, the strongest negative correlation is between real effective exchange rate (country risk ratio) and social/human group for sustainability, it means that if one indicator increases, another one is decreasing and vice versa. Good positive correlation is between current taxes on income, wealth, etc. and natural population change (country risk ratios) and social/human group for sustainability. Such ratios of country risk as Gross Domestic Investment, Inflation, Balance of Trade and Employment rate are not very influencing (no strong relationship) all sustainability ratios.

It was proved that economic sustainability has relationship/dependence with country risk ratios.

4. For future investigations, new methods for country risk assessment and sustainability evaluation could be used (for example, S&P ratings) and results compared to those received by using MULTMOORA method. As well, a new investigation on interrelationship between economic security and country risk with economic sustainability could be introduced.

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